FORMATION OF KNOWLEDGE OF GEOMET AND SKILLS OF STUDENTS OF ELEMENTARY SCHOOL

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Abstract

The article is devoted to the problem of formation of geometric knowledge and skills in young schoolchildren. This article provides students with opportunities to study the properties of plane figures, to form spatial ideas and to apply the acquired knowledge, to develop students' measurement and graphic skills, to determine the prototypes of geometric figures in life, to get acquainted with the units of measurement of geometric quantities.

From the point of view of the existing educational program (curriculum), special attention is paid to the teaching of geometric material in the mathematics content course of primary school with a new content. In this regard, the relevance of the topic is justified.

The scientific article gives various types of tasks related to the perception of figures to strengthen and clarify geometric knowledge. The author shows the main elements of the figures and explains the identification of similarities of these figures in the surrounding world. For this purpose, the article explains in detail the study of elements and properties of fabric, broken line, angle and polygon. Concrete examples from mathematics textbooks are analyzed.

The article notes that it is useful for students to use knowledge about geometric figures in the analysis of the shapes of objects in the environment. To do this, give children a classroom wall, window, flag, etc. can be instructed to determine the form.

At the end of the article, valuable suggestions are made as a result of the research driven. The author points out that the formation of basic geometric knowledge and skills in primary school students helps them to master complex geometric material more easily in the upper grades in the future. At the same time, measuring, building and cutting in primary school has a positive effect on the development of students' life skills.

At present, mathematics is taught in Azerbaijan on the basis of an approved curriculum. This curriculum presents key learning outcomes through the interaction of content and action lines to determine what students need to know and be able to do.

The subject curriculum on mathematics of I-IV grades consists of five content lines. One of them is "Geometry" content line.

The study of the properties of plane and space figures, the formation of spatial ideas, the analysis and solution of mathematical problems using the properties of geometric figures and geometric methods are

provided through the geometric content line. In lower grades, basic geometric shapes (eg, triangles, circles, squares, and cubes) are identified through the geometry content line. In later classes, the study of the properties of geometric figures is expanded and deepened, various geometric relations and geometric transformations are included, and spatial geometry is taught in more detail (1, p. 9).

From this point of view, elementary classes provide opportunities to get acquainted with simple geometric figures, study the properties of plane figures, measure length, perimeter and area, construct geometric figures and determine their similarities in the surrounding world, solve geometric problems.

In the first grade, students are given information about the broken line. In fact, although no specific name has been mentioned, preparations are being made to include the concept of a broken line. The broken line is made up of several pieces, the end of the first piece is the beginning of the second, the end of the second is the beginning of the third, and so on. is called the figure obtained by taking. These pieces do not form new pieces. Students are taught the definition of the following new term: The pieces that form a broken line are called its sides. If we mark an arbitrary point on a piece, this point will divide the piece into two parts (two parts). But these pieces do not form a broken line.

It is very important not to show students the broken line model, but to make it for the students from soft wire. This model can be made from sticks and plasticine rollers, or by breaking the fabric (thin rod) at one or two points. Such illustrations are in line with students' perceptions of the broken line and are well reinforced by the term "break."

t is also important to show students the closed broken lines visually. It is necessary to draw closed broken lines on paper and model them with sticks or wires. This significantly helps students become familiar with polygons in the future. Because the boundary of a polygon is a closed broken surface.

As a result, first graders should be able to say the number of pieces that make up a geometric figure, the broken lines in the geometric and other figures depicted, their sides, and find the number.

Gradually, first graders learn to answer the question, "Show the pieces in the pictures." Students can show three or six pieces in the picture.

The practice of drawing broken lines on checkers serves not only to form the skills of constructing figures, to master the properties of these figures and the appropriate terminology, but also to prepare students for future acquaintance with other geometric figures, including polygons.

Primary school students encounter polygons both in life practice and in the process of teaching parallel subjects before teaching mathematics at school. The study of the origin and development of geometric imagery shows that most children are familiar with a figure called a circle (they are able to distinguish it from other figures). The teacher should use this acquaintance when giving the first information about polygons. You need to look at a circle and a polygon cut out of cardboard by comparing them and demonstrating the two together.

To explain the concept of a polygon, students should use geometric shapes known to them: dots, pieces, broken lines. Tasks are given to draw a polygon and build a model on paper. In this case, it is advisable to

use checkered paper. Let's take an example. The children (the teacher can also dictate) complete the following task in a checkered notebook: “Mark the point where two straight lines intersect. Mark the second point outside the six checkers. Mark the third point four checkers below the second point and three checkers to the right. Connect all three points with the piece. As a result, all students should get only one and the same figure (triangle). The teacher draws the sketch again on the board and, together with the students, reconsiders the procedure for drawing the triangle. This is a closed broken line. They form the borders of the polygon, which we can paint with colored pencils, and then (along the border line) cut the paper. These pieces that make up the boundaries of the polygon are called the sides of the polygon, and the ends of the pieces are called the vertices of the polygon. The teacher points to the figure in the picture and notes that this polygon has three sides and three vertices. Note that the more sides a polygon has, the more vertices it has, or vice versa. Such a polygon is called a triangle. Students are told that the name of a polygon is determined by the number of its vertex (side, angle). For example, if a polygon has seven vertices, it is called a hexagon, and so on.

From the elements that make up the polygon, number sticks, notebook checkers, dots, etc. In addition to being used as a number, it is also used as a number and calculation material in all lessons. While learning numbers, students also learn how to construct a polygon, and gradually master the rules of construction.

It should be noted that primary school students need to be taught to distinguish and correctly represent the elements of a polygon through both mathematics and other subject materials: A hill is a point, so the student shows exactly each hill point (the pointer points to the corresponding point). The sides of a polygon are pieces, and the pupil demonstrates it by moving from one point to another (the pointer moves from one point to another with the edges of the piece).

When constructing polygons, it is not correct to limit its activity only to the drawing of convex figures. From the figures of different shapes, for example, from the description of the State Emblem of the Republic of Azerbaijan given on the first pages of all textbooks (mathematics, life skills, native language, etc.) (83, p.4), etc. students need to be taught to construct polygons of different shapes using. As a result of the correct work, students should be able to answer the following questions on the picture.

a) What figures are depicted in the picture?

1- curved line, 2- straight line segment, 3- point, 4- closed curved line, 5- circle, 6- closed broken line, 7- quadrilateral, 8- pentagon, 9- hexagonal, 10- straight line, 11- broken line.

b) How many sides (vertices) does a polygon have 7, (8, 9)? How many sides are there on the broken line 6 (11)?

Gradually, students can move on to building complex figures.

"Which figures in the picture are you familiar with?" The children answer (and show) the question: "This drawing depicts a circle, a rectangle, two triangles, five pieces." It is important to teach students to show familiar geometric shapes on the objects around them, as well as inside their parts. When working on objects in the environment in different subjects, it should be related not only to the shape of the figure (its appearance), but also to the determination of the number (number of figures, number of parts).

In the process of drawing pieces and polygons, children get acquainted with the relations "big", "small", "equal" starting from the first grade. With the help of a simple system of tasks, children also have the experience of comparing pieces. For example, students use notebook checkers to decide which of the pieces is larger: above or in the middle; they try to determine which is smaller: the one below or the one in the middle. Because the lengths of the above and below pieces are equal, they are called equal pieces.

Students are then asked to identify and show equal parts in a more complex way, such as if they are the sides of a polygon. Such tasks are performed by eye, and a strip of paper or rope is used to check the results. Students mark the endpoints of the piece on a piece of paper and compare it by placing it on the other piece.

The second piece is larger than the fourth piece (this is also clear to the eye). It is difficult to compare the first and third parts. Mark the endpoints of the first piece on a piece of paper and place it (these dots) on the third piece so that the first piece is smaller than the third piece.

It is not recommended that first graders, who do not have sufficient experience in comparing pieces, be given information about "equal" and "unequal" pieces in the first place. Children must first gain detailed experience in comparing pieces. Gradually moving to the upper grades, it is necessary to work on the comparison of the pieces given in more complex forms given in other textbooks. In this case, the practice of comparing pieces from a ruler, roulette, compass, etc. It is also recommended to include.

It is a very responsible moment in the education of young schoolchildren to get acquainted with the measurement of pieces, their comparison by size. Since this concept is applied in the teaching of all subjects, it is more appropriate to form and strengthen it in the process of teaching all subjects. Therefore, the methodological direction we will comment on can be applied to all parallel subjects of primary school. This approach is due to the fact that the concept of length of pieces is the first step in the formation of general ideas about the measurement of geometric quantities, as well as the importance of measuring the piece. In the first stage, clear ideas about the measurement of the pieces should be formed. Research has shown that it is more appropriate to use step-by-step board measurements for visual purposes. Measuring a blackboard (or other piece) in steps means counting the steps from beginning to end.

The teacher instructs one student (the tallest) to measure the board. The student measures in steps, for example, 5 steps. Then this work is assigned to another student (the smallest in height), and then another result, seven steps are taken. This work is repeated when measuring the width of the school gym, the width or length of the yard.

According to the teacher, people have identified a single unit of measurement for measuring pieces in different areas (board length, gym width and length, yard width and length, line length in writing, tree height, street width, well depth, etc.). Students take turns (with the help and guidance of the teacher) measure the length of the board in meters and get the same number, for example, "4".

Students understand that when everyone measures the board with a meter, they will get only the same number. In the teaching of other subjects, other parts (for example, the width and length of the classroom, gym, planting area, various materials in the workshop, the length of the distance from school to the school, etc.) can be measured in meters. At this stage of the fabric measurement, attention should also be paid to the use of another unit of length, centimeters.

The need to introduce a new unit of measurement stems from the impossibility of measuring in meters the distances between some small pieces, such as the length of a pencil, the width and length of a book, the width of a desk, the height of a table, and items in the Life Skills textbook. Another unit of measurement, the centimeter, is used to measure small pieces. According to the curriculum and the relevant text of the textbook, first graders should learn to determine the dimensions more accurately using a ruler. Students should be told that every 10 small divisions on the ruler is equal to one centimeter. It is written briefly as cm. For a start, you can show a centimeter model: a strip of paper 1 cm long (the width of the strip should be significantly smaller than the length), a 1 cm match, a piece of wire. Students should be informed that each item is 1 cm long. Students should be told that the length of the piece is 1 cm by marking a point at the intersection of the lines in the notebook and counting 2 checkers to the right (left, up or down). Students are shown a scale ruler and are told that the length of the piece connecting the 2 points (with a large dash) is 1 cm. Children draw a piece of paper equal to 1 cm on a checkered sheet and make several models of centimeters (made of cardboard or matches) in a technology class.

One of the most important steps in the formation of ideas about the measurement of fabrics is the use of the 1 cm model in the teaching of other subjects. Research has shown that it is more appropriate to teach students to solve the following types of problems with the centimeter model:

The issue. Measure a long piece using a centimeter model. When doing this, the teacher should closely monitor the students' activities: place the end of the centimeter model exactly on one of the ends of the piece being measured; mark the other end of the centimeter model with a pencil on the measured piece; place one end of the centimeter model on the newly acquired point and mark the other end to get another point on the fabric. It should then be explained that 2 cm is separated by the second point. In the same way, move until the end point coincides with the end of the piece. Thus, the student counts the centimeters separated on the piece and gets the length of the piece (in centimeters). If there is no overlap, the student responds: "The length of this piece is greater than 4 cm and less than 5 cm."

Once you have developed enough skills to use the centimeter model to measure pieces, you can do a test (math test).

The teacher dictates: “Mark the point where the two lines intersect on the left (right) side of the page. Mark 9 checkers to the right (left) and 3 checkers below this point. Combine these dots with the fabric. Measure the length of the piece obtained with the help of a centimeter model. ”; “Measure the width and length of our three-color flag depicted in the picture. Draw and color it in your notebook.

Tell me what the colors mean. ”

In carrying out these tasks, the teacher should pay special attention to the development of the following abilities:

1) draw a straight line with a ruler and pencil or take a definite line on a notebook sheet;

2) mark a point (one of the ends of the piece) on that line and separate the required number of centimeters from this point in a certain direction (each time with a pencil);

3) mark the second end of the piece with a pencil.

Experience shows that in the first stage, the implementation of such tasks creates difficulties for students. This is explained by the fact that students do not yet have the ability to work with a small centimeter model and a pencil (finger muscles are not trained enough). For this purpose, the tasks should be repeated for a long time and systematically when performing practical tasks in the teaching of other parallel subjects.

At a later stage in the development of fabric measurement skills (higher), tasks similar to the above two are performed with the help of a non-numerical ruler in the teaching of other subjects, especially technology. At the teacher's request, students mark the scale of the ruler on a thick strip of paper with the help of a centimeter model.

There are also simple but very important tasks that serve to strengthen and shape the basic skills of measuring fabrics: "Measure the length of the piece given with a ruler." To do this, the student must "walk" from one end of the given piece to the other with a pencil, pointing and reading every inch.

After developing skills in measuring pieces on a checkered and smooth sheet of paper, children should be taught to measure the surrounding objects first with the help of a centimeter model and then with a self-made scale ruler (without a scale). Number sticks, notebooks, matchsticks, pencils and other small objects can be used as measuring objects. It is advisable to pay special attention to the tasks on measuring the sides of polygons.

For example: “Find any triangular (quadrilateral, etc.) figure given in the textbooks and measure the lengths of its sides.

You do not need to rush to use a ruler with a digital scale to measure. Because, as the research shows, students often make serious mistakes when using such a ruler in the first place. One of the reasons for the mistake is that students do not pay attention to the starting line (which does not always match the edge of the line).

Pupils overlap the end point of the piece with the point that does not have the starting line of the scale and make a mistake. Once the correct measurement of the fabric has been mastered, the above approach to measuring it during reinforcement allows such errors to be avoided. If some students encounter such errors, they should return to using a centimeter model and a strip of paper to measure the pieces again.

In addition to using the unit of length (cm) as a numerical material in the development of skills in measuring parts with a scale ruler in Grade I, it is more appropriate to use the ruler scale first as an illustration and then as a calculation tool for addition and subtraction.

For example: “The piece is divided into two parts by a dot. Measure the length of each section with a ruler. Is it possible to find the full length of the piece without measuring? Check with measurements. "

Using a ruler scale, students add numbers in this order. You need to find the total: 2 + 4. First, "2" is recorded on the scale (two centimeters - 2 units correspond). The student counts 4 cm to the right of this point and writes "6". In this rule, the sum of the numbers is replaced by the sum of the lengths of the pieces.

Students are reminded to move in the same direction (from start to right) when collecting both pieces.

Then the appropriate tasks should be continued in the teaching of "addition and subtraction on the reading of numbers" (2, pp. 53-59). In this case, it is expedient to construct the student's judgment as follows: "Solve the example 3 + 6 with the help of number reading".

Solution: Note the large sum (6) on the number axis. Then count to 3 new steps one by one, until the small accumulation (3). 9 is taken on the number axis. So, 3 + 6 = 9.

This method can also be used to teach exit operations. With collection, it is more convenient to consider a simultaneous exit. For example, it is necessary to perform the exit operation: 8-5. On the ruler scale, "8" is recorded (decreasing). Here 8 cm corresponds to 8 number units. The student then exits this point by counting the number of cm to the left (5 cm). This can be done by counting 1 cm in a row or in groups. The student falls on the "3" sign. You may ask, "After reducing 8 units to 2 units, 2 units, and 1 unit, how else can you subtract 5 units?" Examples include the method shown in the figure, as well as other options suggested by students.

As can be seen, a scale ruler (25 cm long) can be used for a long time as a “counting machine” (until students have mastered the addition table by heart).

Research has shown that it is advisable to start students' acquaintance with a new unit of measurement - the decimeter - at the same time as learning the numbers of the second decimal place. However, a review of existing Mathematics textbooks for primary school revealed discrepancies. Thus, the first encounter of students with the concept of "decimeter" takes place on the topic "Units of length" in the textbook "Mathematics-2" (3, p. 77). The textbook shows that 1m = 100cm; 1dm = 10cm; 1cm = 10mm. Unfortunately, when the relationship between centimeters and millimeters is explained and regular exercises are given on these relationships, the information about the decimeter is cut off, and by the end of the second grade, children do not encounter the "decimeter" unit. This prevents the timely acquisition of the "decimeter" and its application in practice. The research showed the opposite: the concept of decimeter can be taught to students from the second grade by reminding children of the information they have learned from life experience and the content of other subjects. For this purpose, the teacher can explain that the height of the building, the length of the fence, the width of the street are measured in meters. There is another unit of measurement for measuring parts smaller than a meter. It is larger than a centimeter and smaller than a meter, it is called a decimeter. Students are introduced to the short 1dm notation of a decimeter: 3 dm, 5 dm, 15 dm, and so on.

In a technology class, each student makes a decimeter model out of a strip of cardboard or thick paper to draw and measure the pieces. If the teacher first informs the students about the meter, he says that one meter is ten decimeters. Students are shown a meter (divided into decimeters) and used to measure the surrounding objects (in decimeters). With the help of a decimeter or meter (divided into decimeters), students build a model of lines drawn in a notebook, on a blackboard, and in the workshop (technology class) a piece of fabric with a given length.

From the experience of measuring and constructing pieces, it is known that the length of a piece, for example, if the length of a pencil is 12 cm in centimeters, is greater than 1 dm and less than 2 dm in decimeters. Students should know that "the length of a pencil is 1 decimeter and 2 centimeters." The teacher corrects: "the length of the pencil is 1 decimeter and 2 centimeters", and shows its short spelling: 1

dm 2cm. The construction of the pieces continues in practice, for example, length 1dm 5cm, 1dm 9 cm, etc. construction of pieces.

The term "angle" is used not only in life, but also in geometry in several different senses.

Geometric figures in the first grade: plane, because there is not enough information about the beam, they are not told about the angle. Therefore, in the first stage, the concept of "angle" should be used only in the sense of "broken angles of a polygon", based on information from the world, illustrated in various textbooks. Such an approach is more meaningful and visual than the previous approach, and not only dresses the ideas from other disciplines, but also ensures the formation of the concept of polygons on the basis of knowledge from neighboring disciplines.

Information about the angle given to students in grades I-IV should not be tiring. In Grade I, during extracurricular activities or in a technology class, it is best to show students the broken angles of a triangle and the non-convex quadrilateral in order to model the angle. In this case, it should be divided into polygonal parts so that each of these parts has one vertex and two sides protruding from the vertex.

It should be explained here that the vertex of a polygon is also the vertex of the (corresponding) angle. When carrying out this work in the learning process, it is more expedient to first acquaint students with paper angle models. The children divide the paper polygon into parts. Creating students' correct perceptions of angles depends on their ability to represent them correctly. To do this, place the large end of the pointer at the top of the angle and turn the pointer to the other side by turning it from one side with "specific movements".

It is also possible to open the content through movement: "the angle can be reduced" (small meat), "the angle can be increased" (large meat). For this purpose, a model (two narrow smooth pieces of plywood reinforced with plasticine) developed by the students themselves (in technology class or independently) can be used.

Students are told (models are shown) that the closer we get to the edges of the angle, the smaller the angle, and the more we separate it, the larger the angle will be. The initial ideas related to the concept of angle are reinforced and formed in the given practical lessons.

The notion of a rectangle should be explained gradually through the interaction of the mathematical knowledge and skills that children have acquired so far, the empirical information they have gained through observation, and the teaching materials illustrated by pictures in parallel subjects. One, two, three and so on. It is best to begin with a review of polygons that are rectangular and are illustrated in various textbooks. It is also advisable to use checkered sheet lines to construct a polygon with a rectangle in class I. It is important to draw students' attention to the fact that some straight lines form a rectangle. These angles are also used in the construction of polygons. First, the rectangular inventory in the classroom (corners of the board, corners of the window, corners of the table, etc.), then the objects depicted in a rectangular shape in the pictures in various textbooks, and so on. is displayed, a right angle is found, its vertex point and sides are shown. Then a triangle with a right angle is constructed: First the vertex of the rectangle is marked, then the sides of the triangle forming a right angle, and finally the third side.

A similar work is continued by finding figures with two right angles, showing their vertices and sides. In this case, try to build a triangle with two right angles. Students mark two points (two vertices of a triangle) and connect two rectangles, and finally realize that the triangle is "not taken" because its lines (sides) do not intersect.

Thus, it can be concluded that a triangle has only one right angle.

Then one or two rectangular figures with right angles are recognized, the angles of finding are shown, and finally constructed. When constructing a quadrilateral with three right angles, the students conclude that its fourth angle will also be right.

The correctness of all angles of the pentagon is also checked by the students. Using real-life examples and pictures from different textbooks to construct different polygons, students are encouraged to conclude that only all the angles of a rectangle can be straight. Such a rectangle is called a rectangle.

Students observe objects in the environment. They are rectangular list the names of objects in the form: blackboard, floor, window glass, etc. When comparing rectangles, children come to the conclusion that its opposite sides are equal. This can be checked without measuring. Children, for example, know that a notebook is rectangular in shape. With the help of the drawing triangle, they make sure that all the angles are straight. It is also shown that the right angle is obtained by folding the paper. By folding the sheet, they make sure that the opposite sides overlap, that is, that they are equal. Here, it is noted that both the four angles obtained and the opposite sides are the same, ie equal.

Finally, students can begin to solve problems involving the construction of polygons with given side lengths. This is easier because in the first grade, mainly checkered notebooks are used.

The issue. Draw a rectangle 4 cm long and 2 cm wide.

The student marks a vertex of a point-rectangle at the intersection of two lines on a checkered sheet. Children know that one side of a rectangle coming out of this vertex is its length, and the other is its width. So, it is necessary to draw two pieces from this point:

1) take a right angle between them;

2) the length of one piece should be 4 cm and the other 2 cm.

With the help of checkers, children build a rectangle (this can be done without the use of a ruler, because students already know that two checkers are one centimeter). The three points obtained are the three vertices of the rectangle. By counting the checkers without taking measurements, the students find the fourth hill point. Connects the vertices in sequence (with a ruler), hatches with a colored pencil. Students construct a rectangle 4 cm long and 2 cm wide. This work continues in extracurricular activities in various subjects and in the form of practical assignments of various nature.

In the first year of training, geometric figures and objects were used as counting objects. Later, the elements of the figure (sides, angles, heights of the polygon) are also used as such objects. In the first grade, students learn how to measure a piece, which allows them to make connections between a piece and a number.

Familiarity with the measurement of the piece creates a visual illustration in them (children) of ideas about natural numbers, the decimal number system (cm-unit, dm-hundred, km-thousand) (6, p.4).

When considering the role of the teacher in the teaching of geometric material in primary school, it becomes clear that it is important to determine the methodology that provides the disclosure of geometric content. The main objectives of teaching this material are identified (7):

1) development of spatial thinking;

2) development of reflexive skills;

3) perception of the surrounding world from a geometric position;

4) formation of ideas about plane and spatial figures;

5) preparation for the study of the geometry course of the upper grades.

Research shows that the geometric skills instilled in a mathematics lesson are formed with the help of other subjects. Such related teaching can be continued both in life and in the recognition of objects of different shapes from the objects in the form of colorful geometric figures given in other textbooks, and in the teaching of the signs of figures. Because, these works serve to form appropriate skills and strengthen relevant mathematical knowledge.

The formation of basic geometric knowledge and skills in primary school students will help them to master complex geometric material more easily in the upper grades in the future. At the same time, measuring, building and cutting in primary school has a positive effect on the development of students' life skills.

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